

Figure - 1 : Schematic of a Rcp Application

Q	Queue Name	Q
---	------------	---

Figure - 2 : Schematic of a Queue

QA	Queue Array Name	QA
----	------------------	----

Figure - 3 : Schematic of a Queue Array

VQ	Virtual Queue Name	VQ
----	--------------------	----

Figure - 4 : Schematic of a Virtual Queue

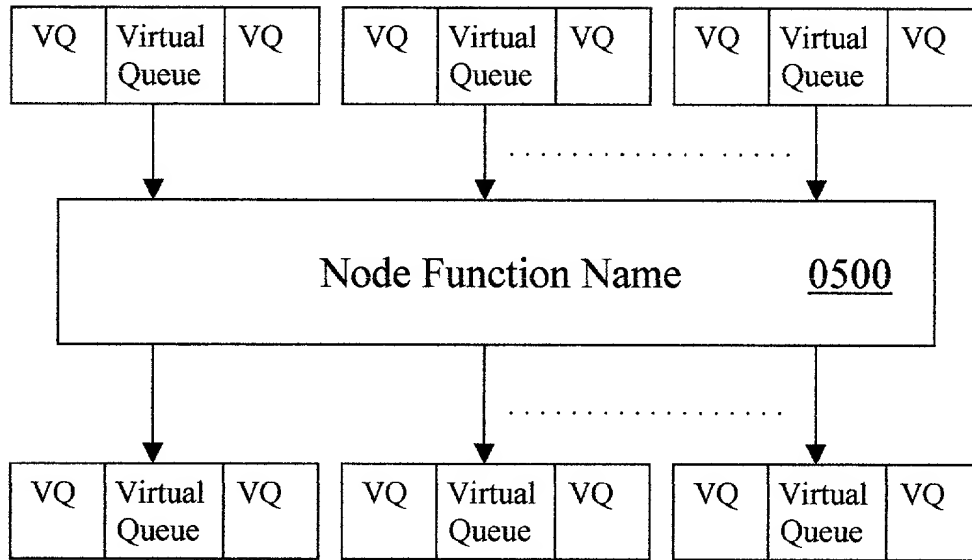


Figure - 5 : Schematic of a Node Function

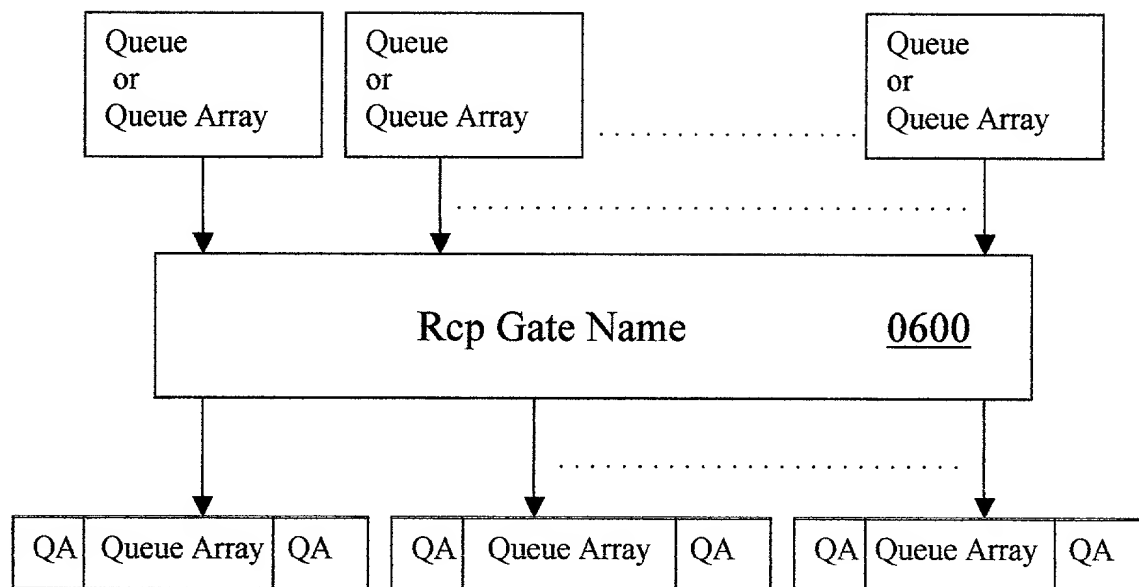


Figure - 6 : Schematic of a Rcp Gate

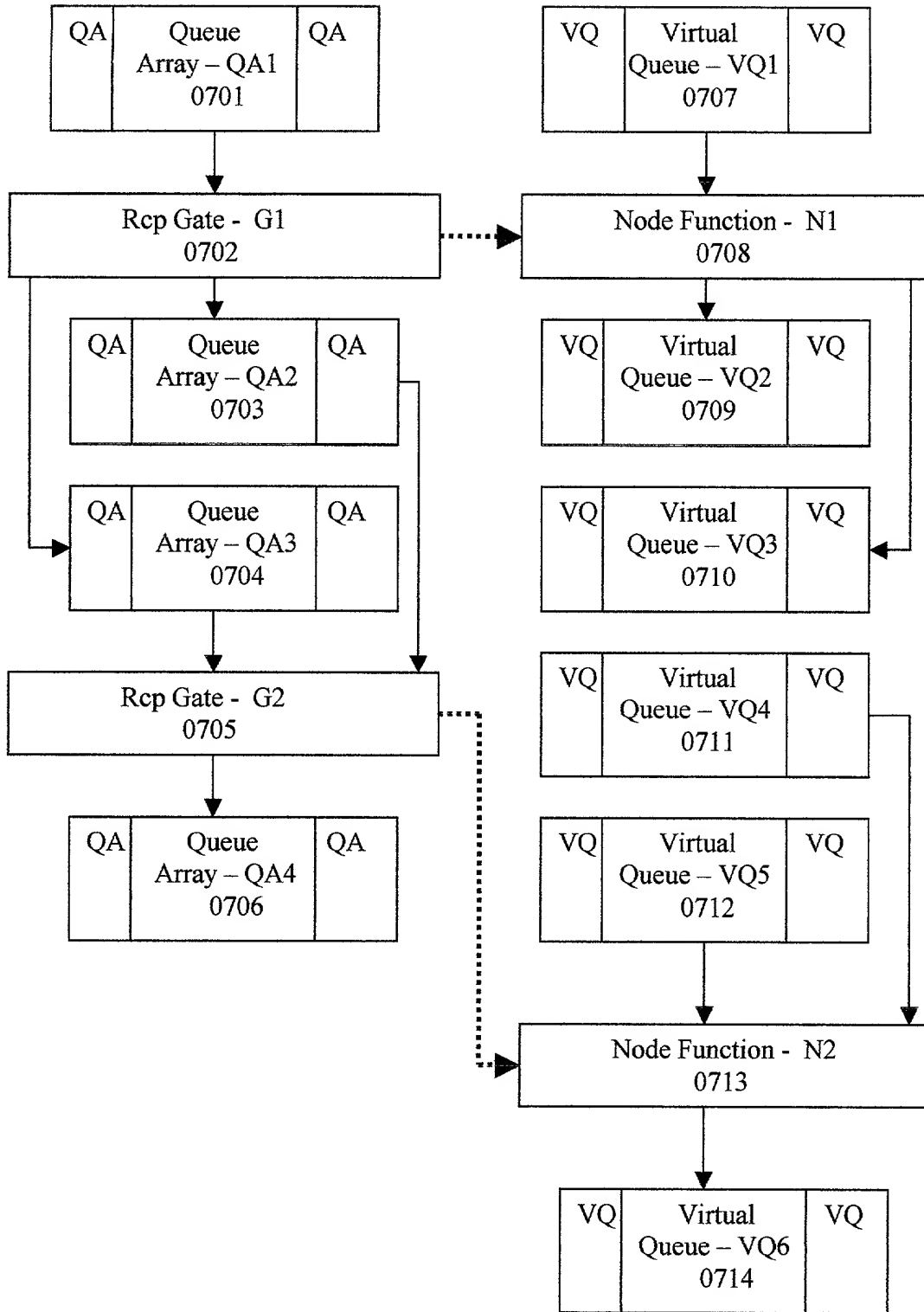


Figure - 07 : Rcp Gate Interconnections

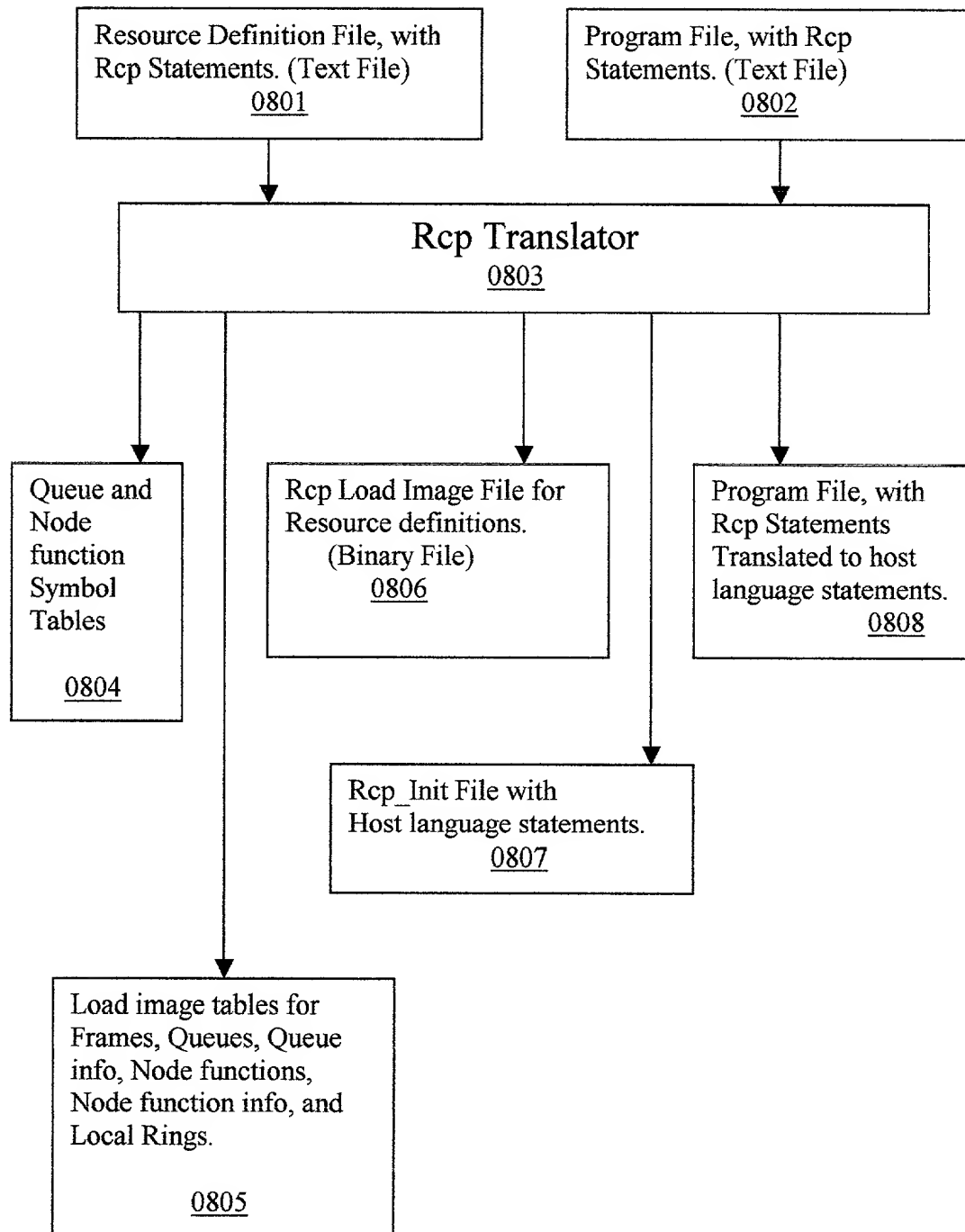


Figure - 8 : Schematic of Rcp Translator

Load Image Header Record	(Fixed Length)	(0901)
Frame Table Record	(Variable Length)	(0902)
Queue Table Record	(Variable Length)	(0903)
Queue Info Table Record	(Variable Length)	(0904)
Node Function Table Record	(Variable Length)	(0905)
Node Function Info Table Record	(Variable Length)	(0906)
Local Ring Table Record	(Variable Length)	(0907)

Figure - 9 : Schematic of a Load Image File Layout

Frame Table Size	<u>1001</u>
Queue Table Size	<u>1002</u>
Queue Info Table Size	<u>1003</u>
Node Function Table Size	<u>1004</u>
Node Function Info Table Size	<u>1005</u>
Local Ring Table Size	<u>1006</u>

Figure - 10 : Schematic of Table Image Header Structure

Frame Status	<u>1101</u>
Min Workers	<u>1102</u>
Max Workers	<u>1103</u>
Frame Lock	<u>1104</u>
Frame Status Lock	<u>1105</u>
Self Assignment flag	<u>1106</u>
Reference to Queue Table	<u>1107</u>
Reference to Queue Status Table	<u>1108</u>
Reference to Queue Info Table	<u>1109</u>
Reference to Node Function Table	<u>1110</u>
Reference to Node Function Status Table	<u>1111</u>
Reference to Node Function Info Table	<u>1112</u>
Reference to Local Ring Table	<u>1113</u>
Reference to Worker Table	<u>1114</u>

Figure - 11 : Schematic of a Frame Structure

Thread Info	<u>1201</u>
Worker Status	<u>1202</u>
Node Function Id	<u>1203</u>
Invocation Num	<u>1204</u>
Worker flag	<u>1205</u>

Figure - 12 : Schematic of a Worker Structure

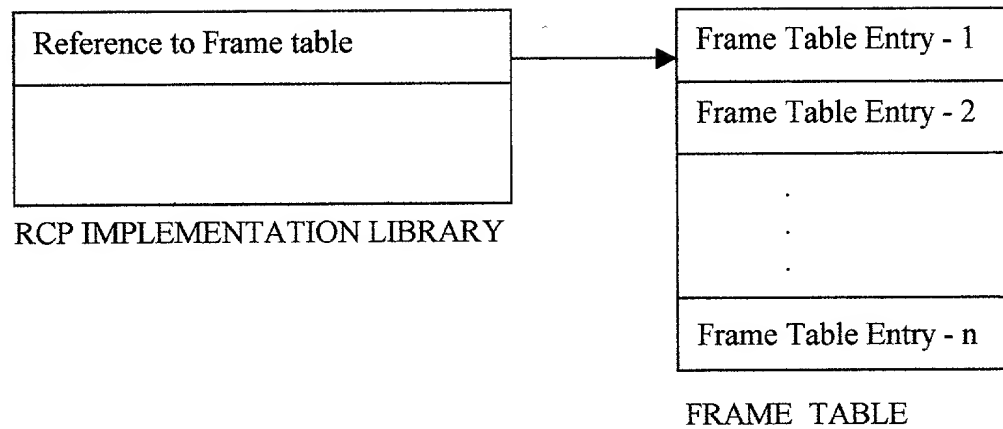


Figure 13 : Schematic of the relation between the Rcp Implemenation library and the Frame Table.

Frame Number	<u>1401</u>
Worker Id	<u>1402</u>

Figure 14 – Schematic of Run id

Queue Type	<u>1501</u>
Queue Info Offset	<u>1502</u>
Bind to Queue Num	<u>1503</u>
Disposition Queue Num	<u>1504</u>
Input-Output Flag	<u>1505</u>

Figure - 15 : Schematic of a Queue Structure

Queue Num	1601
Num of Consumer Functions	1602
Num of Producer Functions	1603
Fctn Num	1604
--- Fctn Nums ---	1604
Fctn Num	1604
-1 (Sentinel)	1605

Figure - 16 : Schematic of a Queue Info Structure

Rcp Gate Num	1606
Num of Node Functions	1607
Fctn Num	1608
--- Fctn Nums ---	1608
Fctn Num	1608
-1 (Sentinel)	1609

Figure – 16A : Schematic of a Rcp Gate info Structure

Function type	<u>1701</u>
Function Info offset	<u>1702</u>
Rcp Gate info offset	<u>1703</u>
Node Function Pointer (Method Reference)	<u>1704</u>
Rcp Gate Num	<u>1705</u>
Max Function Invocations	<u>1706</u>
-- or --	
Local ring number	<u>1707</u>

Figure - 17 : Schematic of a Node function Structure

Node Function Num
Num of input Queues
Num of output Queues
Queue Num - 0
--- Queue Nums ---
Queue Num - n
-1 (Sentinel)

Figure – 18 : Schematic of a Node Function info structure

Bind Info bits	<u>1901</u>
Lock for Bind Info Bits	<u>1902</u>
Next Output Bind Sequence Num	<u>1903</u>
Num of Rcp Gates	<u>1904</u>

Figure - 19 : Schematic of a Local Ring Structure

Queue Status	<u>2001</u>
Reference to Queue Data Node	<u>2002</u>
Reference to Queue Array Node - or -	<u>2003</u>
Reference to Virtual Queue Node	<u>2004</u>
Queue Lock	<u>2005</u>

Figure 20 - Schematic of a Queue Status Structure

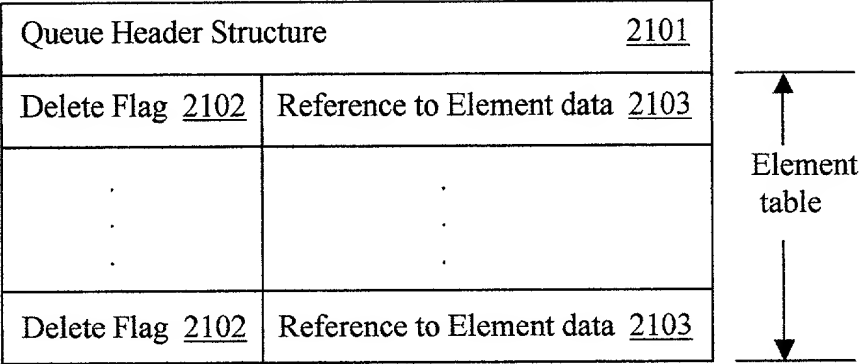


Figure - 21 : Schematic of a Queue Data Node Structure

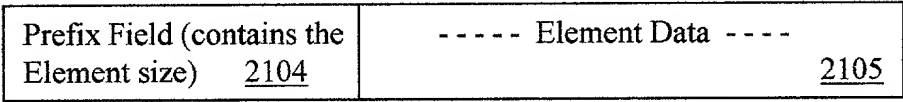


Figure - 21A : Schematic of Element data

Consumer Lock Count	<u>2201</u>
Producer Lock Count	<u>2202</u>
Element Size	<u>2203</u>
Num of Elements	<u>2204</u>
Last Element	<u>2205</u>
Reference to Lock Table	<u>2206</u>

Figure - 22 : Schematic of a Queue Header Structure

Node Function Num	<u>2301</u>
Lock	<u>2302</u>

Figure - 23 : Schematic of a Lock Structure

Num of Queues in Queue Array	<u>2401</u>
Reference to queue table	<u>2402</u>
Reference to queue status table	<u>2403</u>
Ready Queue bits	<u>2404</u>
Not Ready Queue bits	<u>2405</u>
Null Queue bits	<u>2406</u>
Lock for Queue bits	<u>2407</u>
Reference to Bind Sequence Num Table	<u>2408</u>

Figure - 24 : Schematic of a Queue Array Node Structure

0	Status Bits	2409
1	Status Bits	2409
	.	
	.	
	.	
n	Status Bits	2409

Fig – 24A : Schematic of Status Bits Structure

Gate number	<u>2501</u>
Bind Seq number	<u>2502</u>

Fig – 25 : Schematic of a Bind seq number structure

Queue Num	<u>2601</u>
-----------	-------------

Figure - 26 : Schematic of a Virtual Queue Node

Status of the Node Function	<u>2701</u>
Rcp Gate Function release bits	<u>2702</u>
Reference to Node Function Invocation table	<u>2703</u>
-- or --	
Reference to Rcp Gate Node	<u>2704</u>

Figure - 27 : Schematic of a Node function status structure

Rcp Gate Status	<u>2801</u>
First Input Queue Array num	<u>2802</u>
First Output Queue Array num	<u>2803</u>
Node Function Invocations Running	<u>2804</u>
Node Function Invocations Selected	<u>2805</u>
Num of Worker assignments	<u>2806</u>
Input queues available	<u>2807</u>
Output queues available	<u>2808</u>
Pending Inputs	<u>2809</u>
Reference to Bind table	<u>2810</u>
Bind Table Input Index	<u>2811</u>
Bind Table Output Index	<u>2812</u>
Rebind Index	<u>2813</u>
Next Input Bind Sequence Num	<u>2814</u>
Next Output Bind Sequence Num	<u>2815</u>
Bind Lock	<u>2816</u>
Rebind Lock	<u>2817</u>
Release Lock	<u>2818</u>
Producers Terminated	<u>2819</u>

Figure - 28 : Schematic of a Rcp Gate Node Structure

Bind Flag	<u>2901</u>
Null Flag	<u>2902</u>
Input Queue index	<u>2903</u>
Output Queue index	<u>2904</u>
Input bind seq num	<u>2905</u>
Output bind seq num	<u>2906</u>

Figure - 29 : Schematic of a Rebind node structure

Status of Invocation	<u>3001</u>
Bind Status	<u>3002</u>
Rebind Index	<u>3003</u>
Input Queue Index	<u>3004</u>
Output Queue Index	<u>3005</u>
Bind Sequence Num	<u>3006</u>

Figure - 30 : Schematic of a Node function Invocation Structure

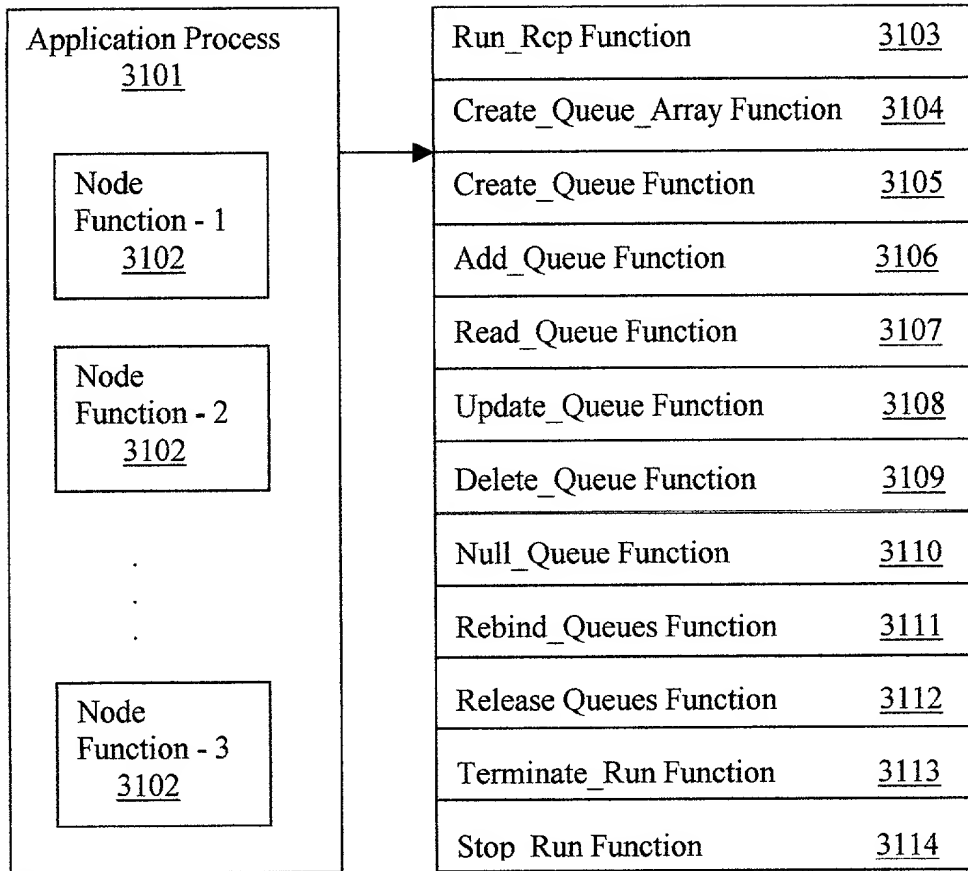


Fig - 31 : Rcp functions corresponding to Rcp Statements

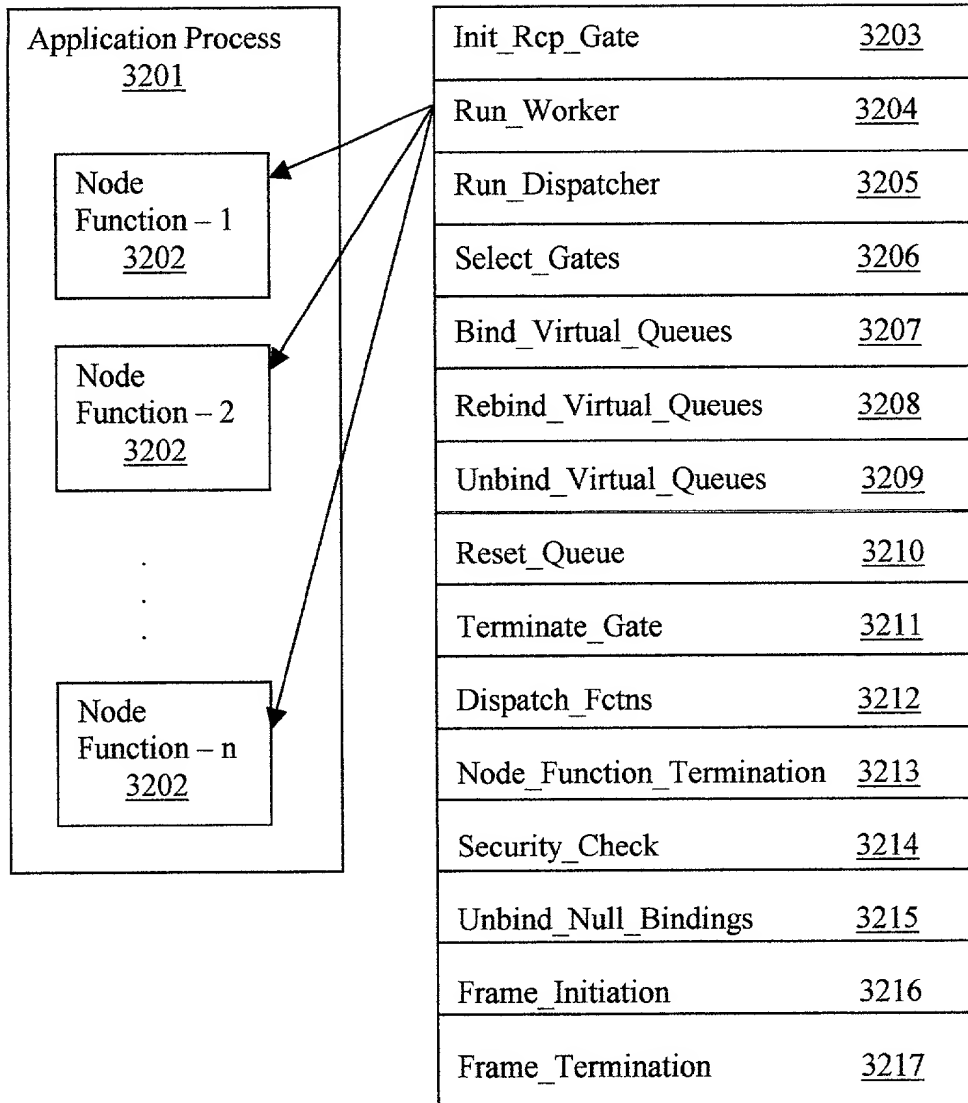


Fig - 32 : Rcp Implementation library Internal functions

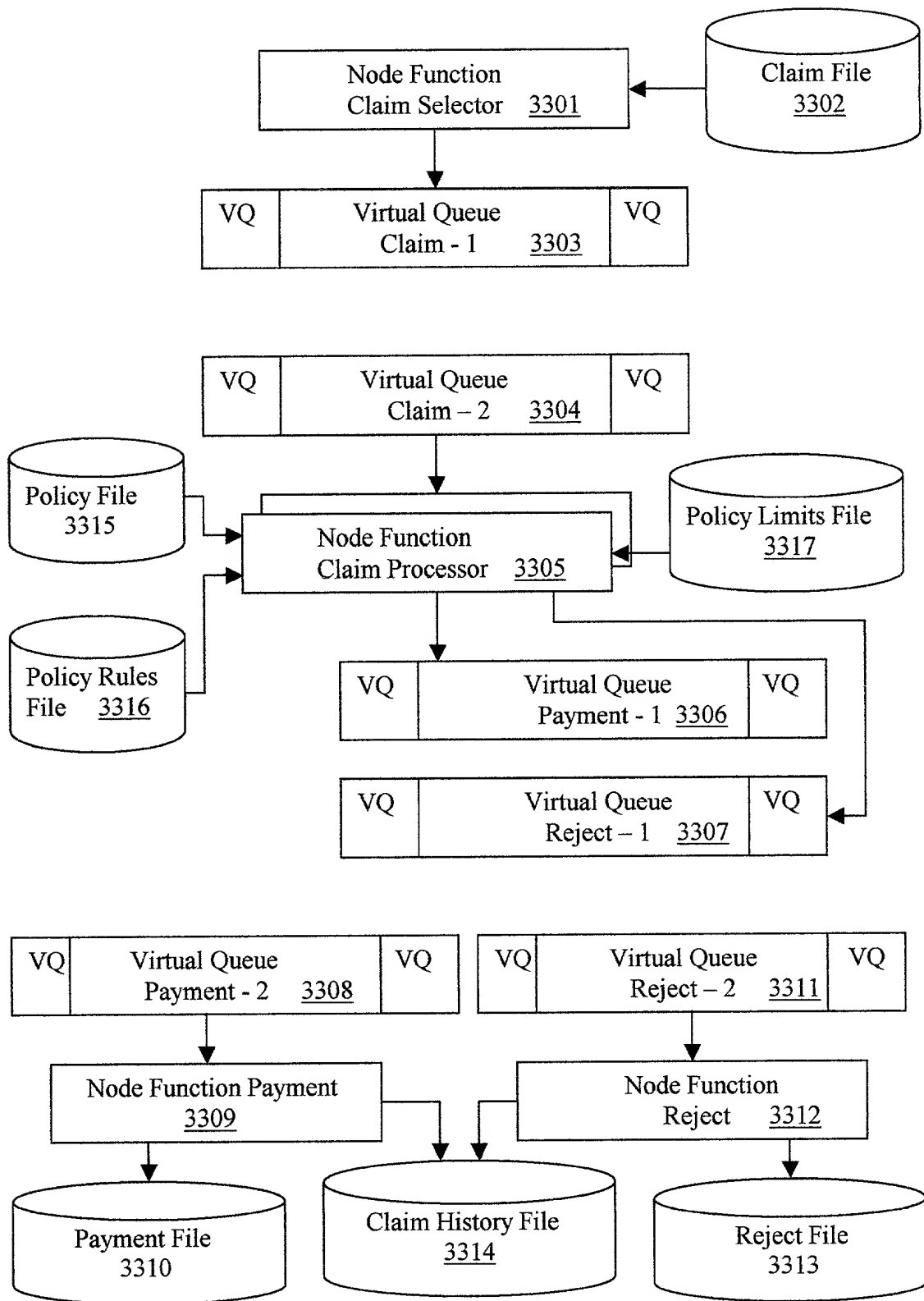


Figure - 33 : Schematic of a sample application (Node Function configuration)

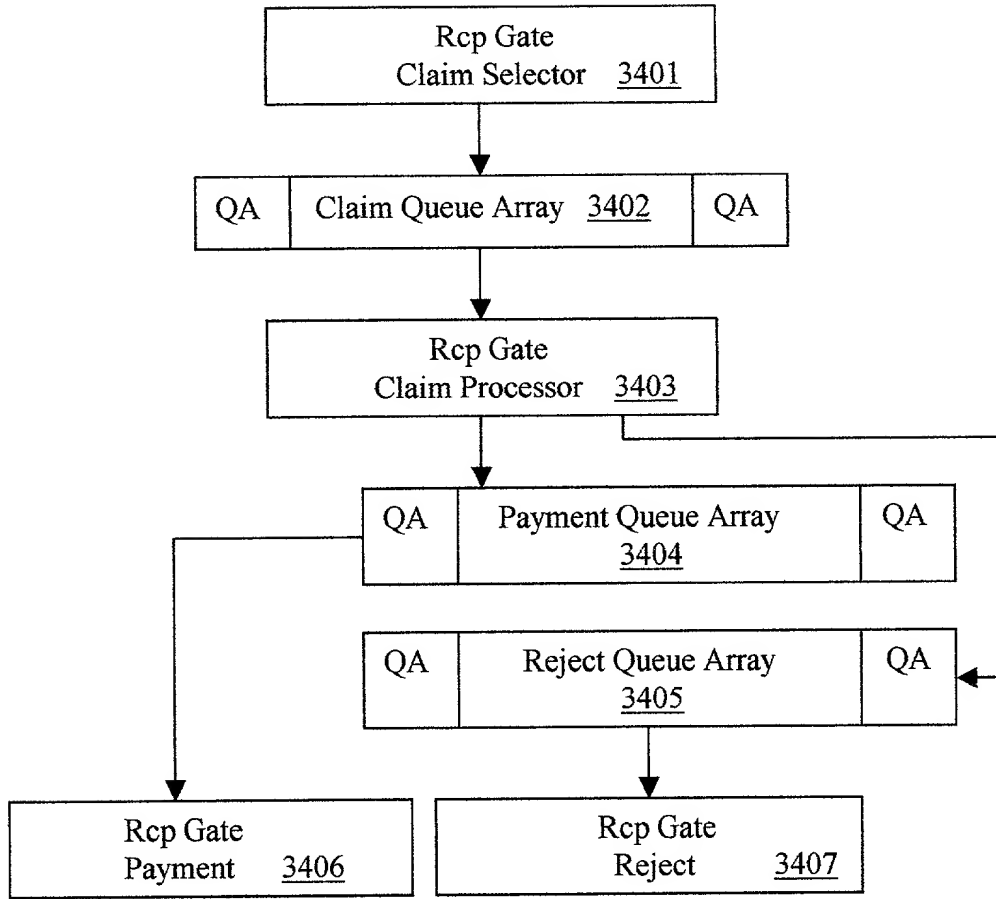


Figure - 34 : Schematic of a sample application (Rcp gate Configuration)

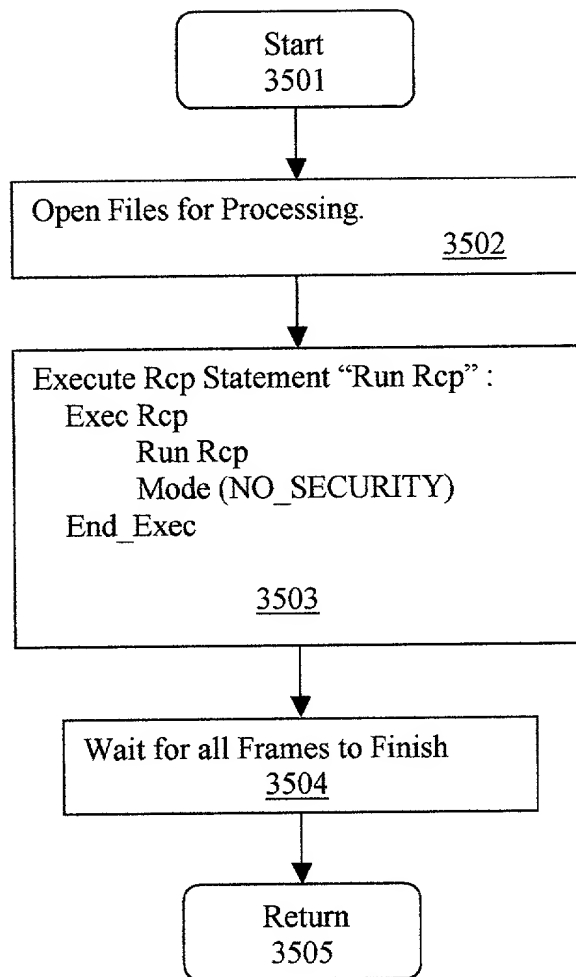


Figure - 35 : Flow chart of the Main function in the sample Application

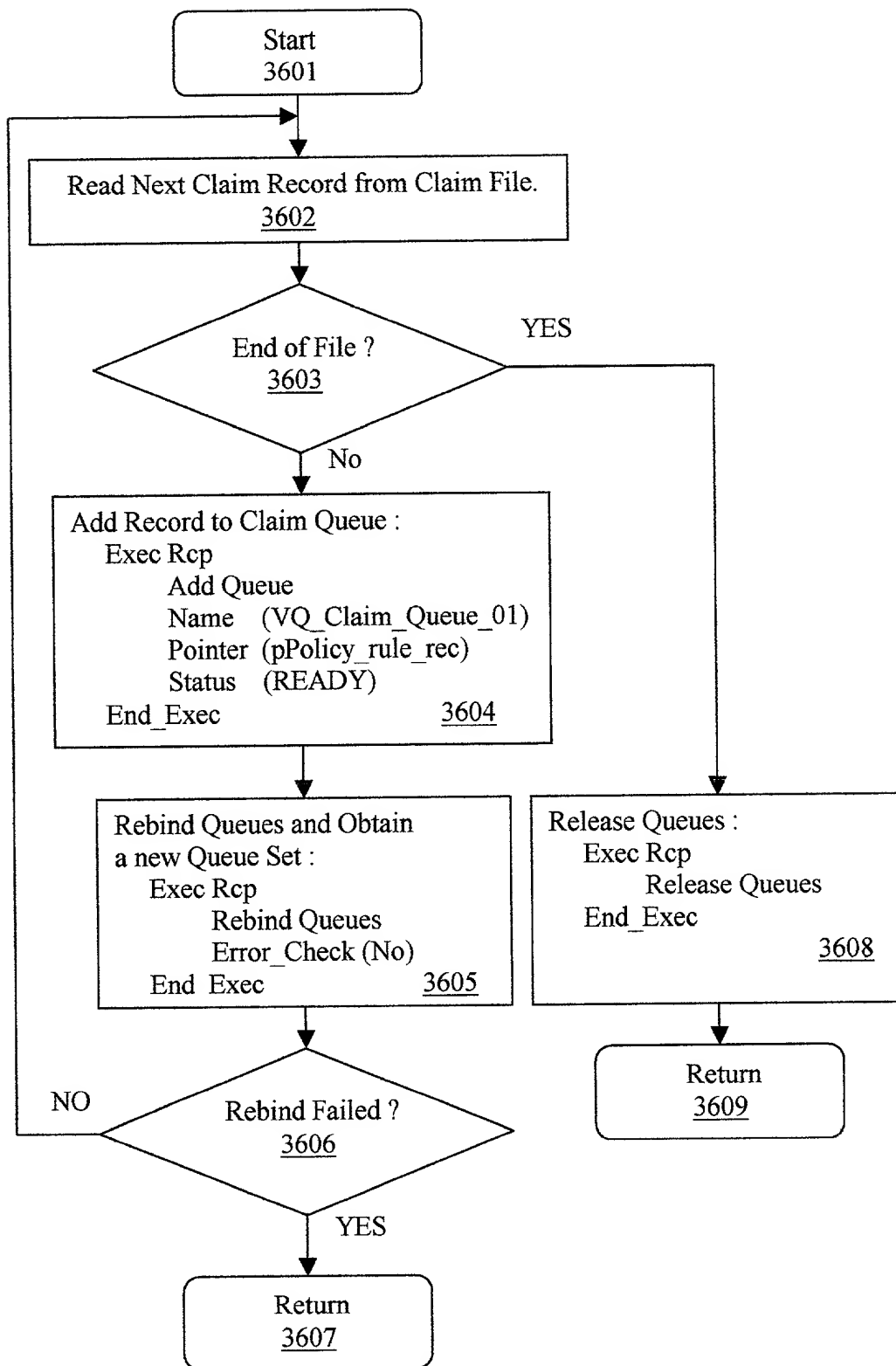


Figure - 36 : Flow chart of the Claim Selector function in the sample Application

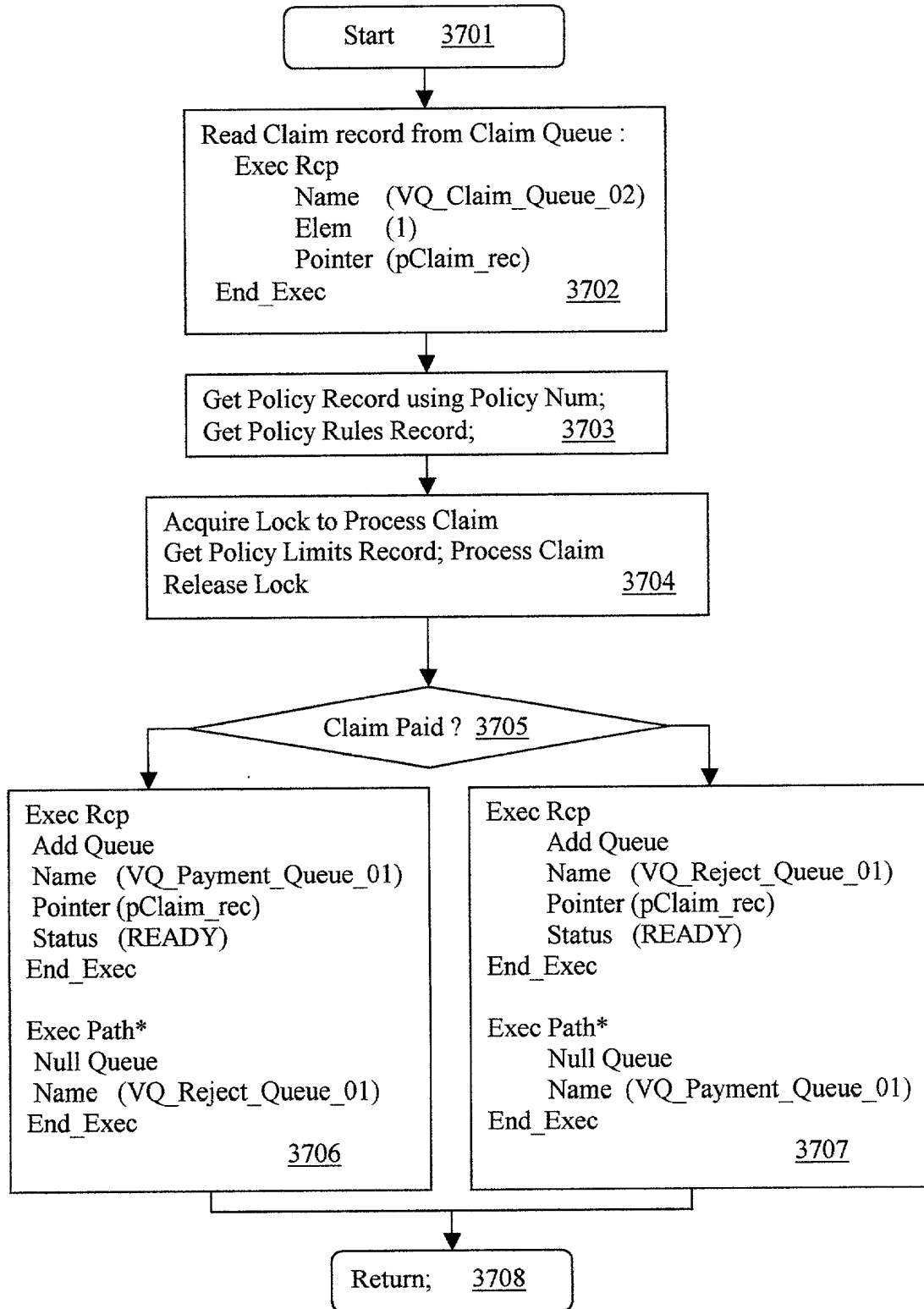


Figure - 37 : Flow chart of the Claim Processor function in the sample Application

Figure - 38 : Flow chart of the Reject function in the sample Application

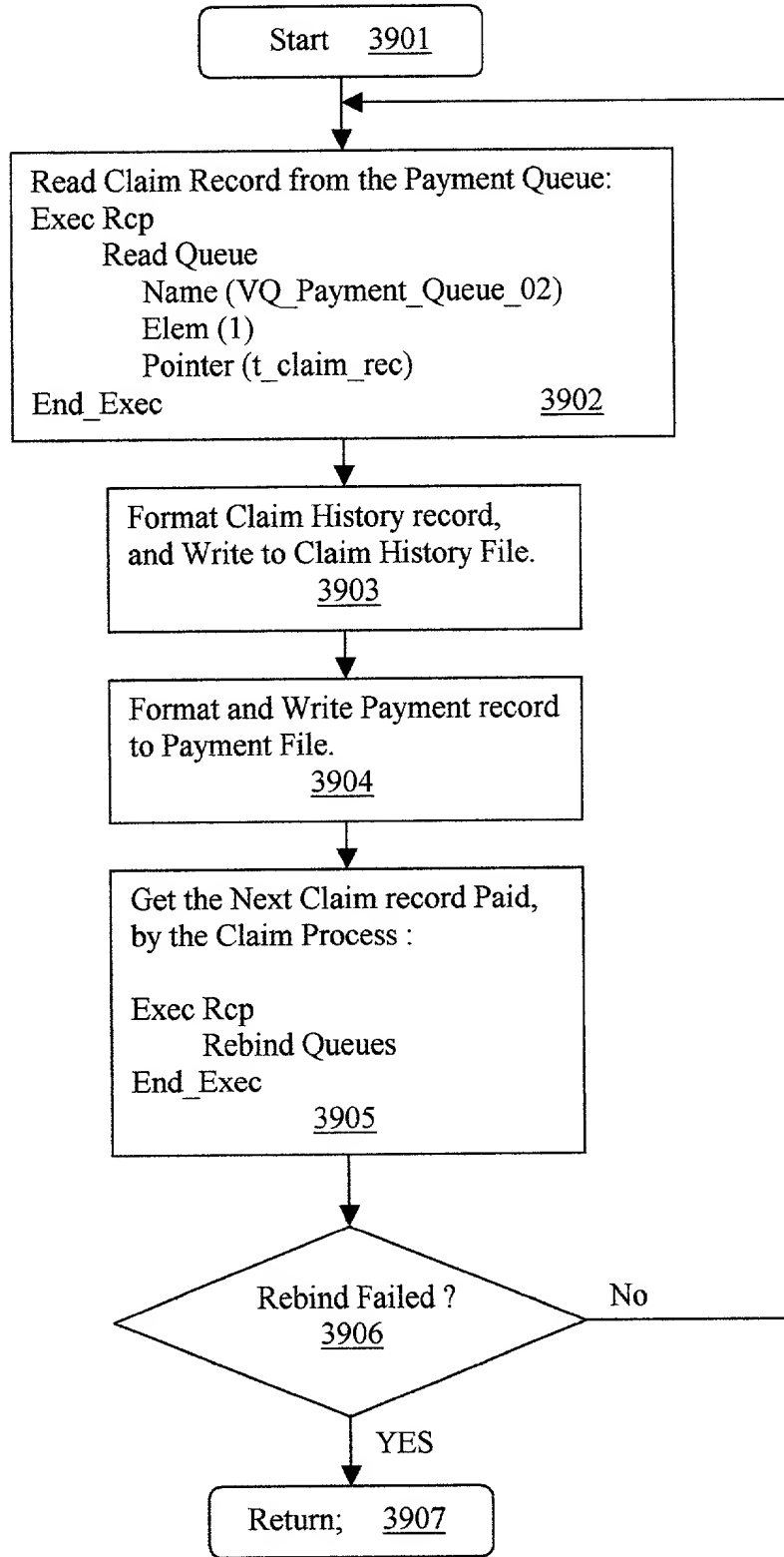


Figure - 39 : Flow chart of the Payment function in the sample Application

	REMARKS	RCP GATE NUMBER	MAX INVOCATIONS - OR - LOCAL RING
0	Rcp Gate Claim Selector	NULL	0
1	Rcp Gate Claim Processor	NULL	1
2	Rcp Gate Payment	NULL	2
3	Rcp Gate Reject	NULL	3
4	Node function Claim Selector	0	1
5	Node function Claim Processor	1	2
6	Node function Payment	2	1
7	Node function Reject	3	1

Figure 40 – A partial view of the node function table for the Sample application.

IMPLEMENTATION LIBRARY TRACE :

RUN_RCP FUNCTION : STARTED : The time is Fri Feb 09 19:03:31.312 2001

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0 WORKER_ID = 0

Fctn invocations selected = 0
Fctn invocations running = 0
Rcp Gate Efficiency = 100
Input/Output Queues Available = 32/32
Input/Output Bind seq nums = 33/33
Worker Assignments = 0

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1 WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2 WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3 WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0

WORKER ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1

Figure – 41 : Trace of the sample application

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0 WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1 WORKER_ID = 0

Fctn invocations selected = 0

Fctn invocations running = 0

Rcp Gate Efficiency = 100

Input/Output Queues Available = 32/32

Input/Output Bind seq nums = 33/33

Worker Assignments = 0

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2 WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3 WORKER_ID = 0

RCP GATE BYPASSED - INPUT/OUTPUT AVAILABLE QUEUES = 0

WORKER ASSIGNED TO - Gate = 1, fctn = 5, Invoke_id = 0 Self_Assignment = 1

Figure – 42 : Trace of the sample application

 EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 0
 Rcp Gate Efficiency = 203
 Input/Output Queues Available = 32/32
 Input/Output Bind seq nums = 65/65
 Worker Assignments = 1

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

 EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1 WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED

 EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 0
 Rcp Gate Efficiency = 100
 Input/Output Queues Available = 32/32
 Input/Output Bind seq nums = 33/33
 Worker Assignments = 0

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

 EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 0
 Rcp Gate Efficiency = 100
 Input/Output Queues Available = 32/32
 Input/Output Bind seq nums = 33/33
 Worker Assignments = 0

-----WORKER
 ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1

 WORKER ASSIGNED TO - Gate = 2, fctn = 6, Invoke_id = 0 Self_Assignment = 0

Figure – 43 : Trace of the sample application

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 0
 Rcp Gate Efficiency = 56
 Input/Output Queues Available = 32/5
 Input/Output Bind seq nums = 190/163
 Worker Assignments = 9

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 1
 Rcp Gate Efficiency = 82
 Input/Output Queues Available = 26/26
 Input/Output Bind seq nums = 158/158
 Worker Assignments = 6

INVOCATION NUMBER = 1

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2 WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 0
 Rcp Gate Efficiency = 100
 Input/Output Queues Available = 8/8
 Input/Output Bind seq nums = 134/134
 Worker Assignments = 0

WORKER ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1

Figure – 46 : Trace of the sample application

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0 WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1 WORKER_ID = 0

Fctn invocations selected = 1

Fctn invocations running = 1

Rcp Gate Efficiency = 82

Input/Output Queues Available = 26/21

Input/Output Bind seq nums = 163/158

Worker Assignments = 6

RCP GATE BYPASSED - PREV FCTNS SELECTED, NOT YET DISPATCHED

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2 WORKER_ID = 0

Fctn invocations selected = 0

Fctn invocations running = 0

Rcp Gate Efficiency = 83

Input/Output Queues Available = 8/8

Input/Output Bind seq nums = 134/134

Worker Assignments = 5

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3 WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED

WORKER ASSIGNED TO - Gate = 1, fctn = 5, Invoke_id = 1 Self_Assignment = 1

Figure – 47 : Trace of the sample application

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 0 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 0
 Rcp Gate Efficiency = 59
 Input/Output Queues Available = 32/26
 Input/Output Bind seq nums = 195/189
 Worker Assignments = 10

INVOCATION NUMBER = 0

NODE FUNCTION INVOCATION - WAITING FOR DISPATCH

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 1 WORKER_ID = 0

RCP GATE BYPASSED - PREVIOUS REBIND FAILED

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 2 WORKER_ID = 0

Fctn invocations selected = 1
 Fctn invocations running = 0
 Rcp Gate Efficiency = 98
 Input/Output Queues Available = 32/32
 Input/Output Bind seq nums = 158/158
 Worker Assignments = 5
 RCP GATE BYPASSED - PREV FCTNS SELECTED, NOT YET DISPATCHED

EXECUTING SELECT_GATES FUNCTION : GATE_NUM = 3 WORKER_ID = 0

Fctn invocations selected = 0
 Fctn invocations running = 0
 Rcp Gate Efficiency = 100
 Input/Output Queues Available = 24/24
 Input/Output Bind seq nums = 158/158
 Worker Assignments = 0

WORKER ASSIGNED TO - Gate = 0, fctn = 4, Invoke_id = 0 Self_Assignment = 1

WORKER ASSIGNED TO - Gate = 2, fctn = 6, Invoke_id = 0 Self_Assignment = 0

Figure – 48 : Trace of the sample application